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The Efficiency of the Costa Rican Payment for Environmental Services Program under Discussion

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Liste des abréviations et acronymes

ES	Environmental Services
FONAFIFO	National Forestry Financing Fund
GEF	Global Environment Facility
MEA	Millenium Ecosystem Assesment
MMBIEM	Mainstreaming Market Based Instruments for Environmental Management
PES	Payment for Environmental Services
PESP	Payment for Environmental Services program
SINAC	National System of Conservation Areas

Abstract

Based on a review of the literature and on interviews of different local stakeholders, this paper assesses the efficiency of the Costa Rican Payment for Environmental Services Program (PESP) as a conservation tool focusing on its main modality: the forest protection one. The PESP has had a low direct impact on the forest cover of the country but may have had an important indirect impact as it served as compensation for the prohibition of forested land uses change. Furthermore, the PESP appears to have a better impact at a lower cost than the protected area network, the main alternative as a conservation tool. The PESP appeared also quite competitive from the point of view of its costs before the institutional transformation that occurs in 2008. A significant potential for improvement of the PESP efficiency exists on the short term but may affect its legitimacy and impact the social norms and values dealing with conservation in a way that could jeopardize the program effects on the long term.

Keywords: payment for environmental services, impact assessment, Costa Rica, forest protection, institutions

Introduction

Ecosystems services provide valuable services to local, regional and international communities (Costanza et al., 1997; Millenium Ecosystem Assesment (MEA), 2005). However, traditional markets are under developed or lacking for many environmental services (ES) such as watershed benefits, biodiversity, and carbon sequestration. Over the past decades, "Payments for Environmental Services" (PES) (also called ecosystem or ecological services) have received a great deal of attention as a natural-resource management approach (Landell-Mills and Porras, 2002; Corbera et al., 2007; Engel et al., 2008; Wunder et al., 2008; Pattanayak et al., 2010). Wunder (2005, 2007) defines PES as voluntary transactions where a well-defined environmental service (ES) (or a land-use likely to secure that service) is being 'bought' by a minimum of one ES buyer from a minimum of one ES provider if and only if the ES provider secures ES provision during a determined time (conditionality). Pure PES approaches fulfilling all the criteria of Wunder's definition may not always be possible, or even preferable (Wunder, 2005; Corbera et al., 2007). Sommerville et al. (2009) consider PES as an umbrella term for a set of resource-management tools that aim to transfer positive incentives to ES providers that are conditional on the provision of the service, where successful implementation is based on a consideration of (1) additionality[1] and (2) varying institutional contexts.

Our contribution will focus on the case of Costa Rica to shed light on the debates over the assessment of PES. In Costa Rica, the PES program (PESP)[2] has been instituted in 1996 by the Forest Law 7575 and recognizes four ES provided by forest ecosystem: biodiversity, watershed function, scenic beauty and greenhouse gas mitigation through carbon storage and sequestration.

[1] For a PES scheme, additionality consists in paying for the adoption of practices that would not have been adopted in the absence of payment (Engel et al., 2008).
[2] Programa de Pago por Servicios Ambientales (PSA program).

This program is part of a 20 years-long process of forest policy evolution (Daniels et al., 2010) and appears undeniably as a precursor and a model in the developing world (Pagiola et al., 2002). The National Forestry Financing Fund (FONAFIFO), the trust fund in charge of the PESP management, buys to landowners the environmental services generated by some defined land uses, mainly forest ones. Landholders may participate through several land use modalities which currently include (1) reforestation through plantations (which dates from Forest Law to present), (2) protection of existing forests (which dates from Forest Law to present), (3) natural forest regeneration (which dates from first mention in 2005 to present), (4) agroforestry systems (which dates from 2003 to present), (5) forest management (which has been instituted by Forest Law, removed from the PESP in 2002 and reintroduced in 2010). After more than two hundred million cumulative dollars invested[3] (FONAFIFO, 2010[4]), fifteen years of experience and over 700,000 ha of forest contracted in the program (some 13% of the national territory), we attempt to answer the question "what is the efficiency of the PESP as a conservation tool?"

An extensive and dynamic literature exists about Costa Rica's PES (Pagiola, 2008; Pagiola et al. 2002; Zbinden and Lee, 2005; Daniels et al., 2010, etc.) but relatively few studies have taken into account the institutional nature of the Costa Rican PESP in their understandings of its performance. Our objective is to review PES impact studies in Costa Rica and to supplement these by some findings based on interviews carried out in 2009 and 2010[5] that shed lights on the institutional nature of the program. Our study focuses on the forest protection modality (PESP-Protection), by far the most important of the PESP[6]. We begin with an analysis of the

[3] These payments come mainly from a tax on fuel but also from international donors as loans or donations (World Bank, Global Environmental Fund, GTZ) and from the national private sector.
[4] This reference corresponds to datas available on Fonafifo website : http://www.fonafifo.go.cr/paginas_espanol/servicios_ambientales/sa_estadisticas.htm
[5] We have conducted interviews of different actors involved in the design, implementation and evolution of the program such as: civil servants, researchers, representatives of the private sector, of forestry organizations.
[6] This modality concentrates most of the area contracted in the framework of the PESP: about 90% between 1997 and 2008.

environmental effectiveness of the Costa Rican PESP. Then we give an overview of its costs. Finally we highlight some important implications of the potential improvement of the PESP efficiency.

1. The environmental effectiveness of the Costa Rican PESP

We analyze the environmental effectiveness of Costa Rican PESP in three stages: we first study to what extent the PESP has really contributed to the extension of forest cover, then we analyze if the PESP has generated the expected ES, and finally we conclude with an evaluation of the sustainability of PESP environmental outcomes.

1.1. The impact on forest cover

We assess on the one hand to what extent the PESP beneficiaries have really implemented the agreed (forest) land uses, and, on the other hand, if these land uses would have been adopted anyway in the absence of the PESP (additionality).

On the first issue, Pagiola (2008) says that « *the PSA program has established a strong system to monitor land user compliance with payment contracts*». This monitoring is made easier by the uploading on the GPS of the maps of the farms under contract, and is carried out through field visits, forest covers studies through Landsat 7 (since the mid 2000s) and aerial photographies. Non compliance results in the cancelling of the contracts and the refund of the payments[7].

[7] This ensures that, on the whole, only the landowners who did implement the desired land uses, benefit from the payments. However, no data is available about the percentage of PESP beneficiaries that didn't comply with payment contracts and had to refund the payments received.

Regarding the second issue, the importance of the scale of the PESP and the success of the country in reversing the deforestation trend[8] make it tempting to establish a causal link between the PESP and the reduction of deforestation. However, the outcomes obtained in terms of environmental effectiveness can be discussed for several reasons.

First, Pagiola (2008) notices that it is difficult to isolate the effects of PESP of those induced by others environmental policies and of the economic context. Indeed, the PESP has been instituted along with the prohibition of deforestation[9], for which it represents in some ways compensation. As this measure has allowed reducing deforestation and as it has been made acceptable and thus possible by the PESP, this program can claim to have contributed indirectly to reduce deforestation (Pfaff et al., 2006). Nevertheless, the protected areas system (Sanchez-Azofeifa, 2007), the fall of the profitability of livestock farming reducing the incentive to convert forests in pastures, in particular in isolated areas (Pagiola, 2008), the development of ecotourism (Rojas and Aylward, 2003) and the increase in emigration (Kull et al., 2007) have also contributed to reduce deforestation. Furthermore, the trend of increasing forest cover dates from the early 1990s that is to say before the launching of the PESP (Wunder, 2007).

Moreover, several studies show that many beneficiaries of the PESP say that they would have protected the forest if the PESP-Protection did not exist, which characterizes a low additionality of the program (Miranda et al., 2003; Ortiz et al., 2003). Based on the beneficiaries' declarations, Ortiz et al. (2003) argue that the additionnality of the program may range from 22% to 27% of the areas contracted at the national level, while Morse et al. (2009) found a higher effect in the North Caribean plain ranging from 40% to 50%.

[8] The forest cover which represented 42% of the territory in 1997, has reached 48% in 2005 (Fonafifo, 2007).
[9] The Forest Law 7575 says in its article 19 that « On the lands covered with forest, changing land uses will not be allowed ».

Thirdly, formal tests to assess the impact of the PESP-Protection on forest cover give contradictory results, depending on the methodologies adopted and their ability to treat methodological challenges[10]. Robalino et al. (2008) consider that between 2000 and 2005, the PESP has allowed to reduce deforestation in 0.4% of the area contracted each year, a result higher than what Pfaff et al. (2007) have found for the 1997 to 2000 period: less than 0.2%. Robalino et al. (2008) attribute this slight improvement at a better targeting[11] of the program and at an increase of the risk of deforestation at the national level from 0.2% to 0.3%. Using an econometric model of gross deforestation, Tattenbach et al. (2006) estimate the proportion of the area under PESP-Protection for which deforestation have been avoided to be 38% during the 1996-2000 period in the Central Volcanic Cordillera Conservation Area. Studying an area including the San Juan – La Selva biological corridor in northern Costa Rica, Morse et al. (2009) found also that while deforestation occurred mostly inside the corridor during the 1986-1996 period, 93% of the natural forest patches cleared during the 1996-2001 period were outside of the corridor to which the PES had been targeted. This may be due to the high level of spatial targeting of the program in this region (Daniels et al., 2010), suggesting the addionality of the program could improve at the national level with the attempt to improve the spatial targeting. In their survey in the Osa region, Sierra and Russman (2006) conclude that the PESP has not allowed to reduce deforestation between 1997 and 2003 but has contributed to the increase of forest cover by favouring natural forest regeneration on non-contracted land. Indeed, the PES funding have been used by landowners as a financial capital to engage in non-

[10] According to Daniels et al. (2010), difficulties to assess the impact of the PESP on forest cover are particularly strong for the first years of the PESP and lie on three interrelated themes: spatial data considerations, sampling considerations and the effects of institutional path dependency.

[11] While the Costa Rican PESP did not initially prioritize applications to the program, some criterias have been defined since 1999 in order to target the most important lands for ES provision and also to fight against poverty. Priority areas for the protection modality corresponded in 2009 to the « conservation blanks », the lands in wildlife protected areas, the lands in biological corridors, the indigenous territories, the districts with a low index of social development.

agricultural productive activities making it easier to abandon agriculture, thus allowing the natural regeneration of forests through the conversion in “bush” of the lands to happen sooner. Daniels et al. (2010) underline this result and suggest that this could have been the case also in the North Caribbean plain, after having interpreted datas of Morse et al. (2009).

Fourth, according to Pagiola (2008), the fact that the PESP has a long awaiting list of people wishing to participate in the program suggests that deforestation is not very profitable in many areas. In fact, participation to the PESP is voluntary, and the landowners choose to participate or not to the program, which can lead to integrate lands whose conservation implies the lowest opportunity costs and whose deforestation risks are the lowest, characterizing a problem of anti-selection (Sanchez-Azofeifa et al., 2007). Several studies (Hartshorn et al., 2005; Ortiz et al., 2003) underline the poverty of the soils of the lands enrolled in the program: as about three quarters of the area under PES schemes have soils that don’t allow an agricultural use, these lands would probably have not been converted to non forest uses (pastures, agriculture or others) if the PESP did not exist.

Additionality of the PESP seems low and variable according to regions, but has globally increased overtime. Nevertheless, it must have been higher than for the other main conservation tool: the protected areas network. Indeed, Pfaff et al. (2008) found that during the 1986-1996 period, when deforestation rate was higher than during the PESP implementation period, the protected areas network have saved 2% of the forest area it covers, that is to say some 0.2% per year.

It is worth reminding that additionality has never been set as an objective of the program (Pagiola, 2008). The PESP does not target participants on the basis of the deforestation risk but

rather on the basis of the areas' potential in terms of ES generation and fight against poverty. Its philosophy is «*to 'recognize' the environmental services of whoever is providing them* » (Pagiola, 2008).

1.2. The impacts on the generation of environmental services

According to Pagiola (2008), **«** *It is unfortunately impossible to determine the extent to which the PSA program has successfully generated environmental services [...] the program remains weak in monitoring its effectiveness in generating the desired services* **»**. The impact of land uses promoted by the PESP on the hydrological and biodiversity conservation services will be carried out in the future on pilot projects in the framework of the MMBIEM project[12]. However, while the ES generated by the program have not been yet measured directly, the potential of ES generation can be estimated indirectly through the analysis of the characteristics of the PESP areas of intervention. The actual ES generation depends on the additionality of the program.

The PESP-Protection impact in terms of hydrological services seems weak. Until now, the PESP has been largely[13] focused on the areas where few hydrological services were likely to be generated and a relatively low number of important areas from a hydrological point of view has been incorporated to the PESP (Pagiola, 2008). In addition, the idea that forest land uses promoted by the PESP would improve the hydrological services is based upon a belief very rooted in Costa Rica and in the rest of Central America that the forest are always beneficial to

[12] The « Mainstreaming Market Based Instruments for Environmental Management » project (commonly called Ecomarkets II) is a 80 millions US$ project from the Global Environment Facility, the World Bank and the Governement of Costa Rica supporting the development of the PESP during the 2007-2012 period (World Bank, 2006).
[13] In 65% of the cases according to Tattenbach et al. (2006).

hydrological services (Pagiola, 2002) while this link is in fact not well established scientifically[14] (Pagiola, 2008; Bishop and Landell-Mills, 2002). Nevertheless, in Costa Rica, the main concern is about water quality for which the link with forest cover is better established (Pagiola, 2008). Finally, two evolutions of the program should allow the improvement of hydrological services generation. The introduction of the water tariff as a mean of funding the PESP should improve the targeting of the important areas from a hydrological point of view as the decree establishing it mentions that the resources it generates should be spent at the level of the same watershed (Pagiola, 2008). Moreover, the hydrological importance has been established as a targeting criterion since 2009.

The PESP impact in terms of biodiversity conservation can be estimated by analysing to what extent the lands enrolled in the PESP are located in priority areas for biodiversity conservation. These priority areas have been identified at the national level in 1996 by the GRUAS study, a proposal of land uses planning for biodiversity conservation that served as a basis for the definition of PESP priority areas. In 2003, a broader definition of these areas includes the priority biological corridors identified by the Ecomarkets project and the National System of Conservation Areas (SINAC). In 2005, some two thirds of the active contracts correspond to priority areas for biodiversity conservation according to the broader GRUAS definition[15] (Pagiola, 2008; Tattenbach et al., 2006; Hartshorn et al., 2005), which seems to be a good performance, although the assessment of the Ecomarkets project (Hartshorn et al., 2005) considers that PESP areas of intervention are too scattered.

[14] Especially regarding the link between forest cover and water volume or the availability of water during the dry season.

[15] The proportion of contracts corresponding to these priority areas has increased since 2003 due to the efforts of FONAFIFO since it took on the responsibility of the application process instead of the SINAC. The proportion of new PES contracts in the GRUAS areas and the priority biological corridors was lower than 48% between 1999 and 2002 and was higher than 60% between 2003 and 2005 (Pagiola, 2008).

The potential amount of carbon maintained in forest due to the PESP depends on the type of forest ecosystem protected by the program: tropical humid forest countain more carbon than dry forests for example. While there is no data available on this issue, the areas involved in the PESP seem to correspond to the diversity of the Costa-Rican forests which store on the whole an important amount of carbon.

Altogether, while the generation of ES depends actually of the additionality of the PESP, the areas involved in the program are important for biodiversity conservation but not for hydrological services generation and do represent an important carbon sequestration and storage potential. No study has been carried on to assess specifically the scenic beauty of the areas contracted under the PESP.

1.3. The sustainability of the PESP environmental impacts

From a contractual point of view and in the case of contracts for forest protection, there is no expectative of sustainability apart from the renewing of the contracts[16], which is what FONAFIFO tries to do to the extent of the available resources, except for the contracts concerning non priority areas (Pagiola, 2008).

The most important factor of the sustainability of the program is its financing. From this point of view, the dependency of the PESP on the tax on fuel is worrying as pressures could be exercised to reduce it in the future, for example in the case of an important increase in energy price. Individual contracts with ES users (hydropower companies, breweries...) are a source of

[16] As we have already mentionned, deforestation is forbidden, which allows to some extent the sustainability of forest protection.

sustainability of the program and their renewing is encouraging but they only represent a small part of the funding: 2.5% of the funds distributed between 1997 and 2010 (FONAFIFO, 2010). The implementation of the water tariff is encouraging as it should generate, once it is completely implemented, 5 millions US$ per year (Pagiola, 2008). FONAFIFO hopes also that the carbon sales on the international market could generate some 1 million US$ from 2012. In 2007, a sale of 0.61 million of tons equivalent CO2 to the World Bank's Biocarbon Fund has already been carried on (Pagiola, 2008). The funding of the PESP for biodiversity conservation purpose becomes an important issue to complete the fundings obtained owing to carbon storage and water services which remain limited. In this view, FONAFIFO has created a trust fund, the « *Fund for Sustainable Biodiversity*[17] » that has received an initial grant from the Global Environment Facility (GEF) of 8 millions US$ in the framework of the MMBIEM project and is expected to receive others grants and incomes from the sale of conservation certificates on the voluntary market[18] (Pagiola, 2008). It is still too early to assess the success of these funds to ensure a sufficient and sustainable funding for biodiversity conservation.

Beyond the established contractual obligations, PESP effects on the long run can also be assessed looking at its capacity to make social norms and values regarding forest conservation evolve. This aspect has been little studied until now and there is no consensus about it. Hartshorn et al. (2005) say that « *PSA contracts may contribute to environmental protection indirectly by making the social norms and preferences of the participants more conservation-oriented* », thanks in particular to the institutionalization of the recognition of ES value. This perception change of forest ecosystems has been noticed by several studies (Locatelli et al., 2008; Miranda et al., 2003; Ortiz et al., 2003) but none of them have used a test group

[17] "Fondo para la Biodiversidad Sostenible".
[18] The MMBIEM projet foresees a funding of 8,1 millions US$ from the Governement of Costa Rica and of 0,4 million for the sale of carbon credit (World Bank, 2006).

constituted of non-participants to the PESP in order to isolate the effects of the PESP. According to Ortiz et al. (2003), 95% of the beneficiaries of the interviewed think that the program (PESP-Protection) has taught the people to value the forest and 93% think that thanks to PESP, landowners are more concerned than before the program about the maintenance of forest, water, fauna and flora. The PESP does not explicitly provide conservation education materials to participants but some organizations that serve as intermediaries in the framework of the PESP have played a key role in spreading environmental information and education.

2. The costs of the Costa Rican PESP

In order to assess the performance of the program from the point of view of its costs, we first study the level of the transaction costs, then the level of the payments, before comparing the overall costs of the PESP to those of the implementation of protected areas.

2.1. The transaction costs

Among the transaction costs, we distinguish the costs of access to the program borne by the participants (the laying out of the application folder including the design of a management plan, monitoring of the contract compliance) from the administrative costs of FONAFIFO functioning (selection, contractualisation, monitoring and fundraising and management). The costs associated to the design of the program are not considered, due to the lack of information available.

The estimates of access costs to the PESP bear by the participants vary from 12 to 18% of the payments total amount according to Miranda et al. (2003). FONAFIFO functioning costs have been initially limited by the law in 1996 to 5 % of the PESP budget, and then this limit has been raised to 7% in 2003. The program appeared then particularly competitive in controlling its costs : according to Ferraro and Kiss (2002), in the USA, administrative costs often represent 25% of the budgets of the conservation contracts while in the case of Water Conservation Fund in Quito, these costs are estimated between 10 to 20 % of the payments channelled through the fund (Landell-Mills and Porras, 2002). However, the institutional transformation of FONAFIFO into a classic public institution made its costs boom since 2008 to reach 22% of the budget in 2008 (Mendes 2009, interview; Vega 2009, interview)[19].

Our analysis shows that transaction costs of the Costa Rican PESP represent some 40% of the total amount of the channelled payments, without considering the costs of the program design. This amount is higher than the level of transaction costs usually observed in developed countries and stands in the highest part of the bracket of the carbon sequestration program's transaction costs in developing countries[20] (Wunder, 2007). The PESP costs could be thus considered as relatively high since the evolution of FONAFIFO status in 2008.

2.2. The level of payments

[19] The compliance of Fonafifo to the normative of public sector administration has led to a substantial increase of the number of employees in order to perform new tasks required by this status (reporting, internal control,…), as well as an increase of labor costs due to mandatory contribution to public pension and social funds.

[20] According to Wunder (2007), the transaction costs of the Canadian program of land diversion represent some 25% of the total costs while those of the conservation reserve program in the USA are probably lower. The transaction costs of the carbon sequestration programs in developing countries vary between 6 and 45 % of the payments.

Payment per hectare had long been uniform across all contracts within each modality (i.e. forest protection; reforestation; natural forest regeneration; agro-forestry systems; forest management) but, since 2009, lands with exceptional ecosystem service value receive higher compensation. Payments range from roughly 41 US$/ha per year for natural forest regeneration, to a cumulative sum of 816 US$/ha for a ten year reforestation (i.e. plantation) contract (Daniels et al., 2010). In 1997, the price proposed for the modality of protection, was 45,4 US$/ha per year for five year period[21] which corresponds to the opportunity costs of the lowest profitable alternative use (extensive cattle raising). This amount seems low, when compared to opportunity costs of others alternative uses[22]. Nevertheless, the importance of the demand, which is almost three times higher than the possibilities of funding (Rojas and Aylward, 2003), shows that it is somehow very attractive. This can be explained by the fact that many of the applicants may have conserved their forests anyway. Furthermore, this price has raised due to political pressures from the PESP beneficiaries to 64 US$/ha in 2005 and came to a maximum of 80 US$/ha for some protection contracts in 2009. As this increase of price was not necessary to find a sufficient number of people wishing to participate to the program, the program already facing a demand higher than available fundings, we can conclude that it resulted in a decrease of the program efficiency (from an economic point of view).

2.3. The comparison with another conservation scheme, the protected areas

According to Sage (2000) and Hartshorn and al. (2005) the protection cost of the forest resources through the PESP is largely lower than the traditional system of land buying by the State and protection through a national park (from 1,4 to 4 times less expensive depending on

[21] The exchange rate used is from the 31/12/2006.
[22] For example, in the North of the country, landowners are offered 800 US$ per year for the renting of their land for pineapple production (Mendes 2009, interview).

the hypothesis set[23]). The PESP costs considered payments levels and administrative costs but not access costs, while the national parks' costs include land buying and parks' establishment and management costs necessary to ensure protection (Sage, 2000). These studies do not compare the benefits generated by each scheme, those being considered arbitrarily as equal. However, unlike land buying by the State, the PESP requires to be continuously funded and its costs may increase overtime with the raise of the opportunity costs of forest protection associated with the country's economic development.

Although the costs of the PESP seem competitive when compared to the costs of the protected areas, there is a potential to reduce the PESP costs and thus improve the program efficiency.

3. What potential for improving the PESP efficiency?

3.1. A potential for improvement on the short run…

The improvement of the PES efficiency can be reached through two levers: the improvement of its environmental effectiveness and the decrease of its costs.

First, it seems that FONAFIFO functioning costs could be reduced as they have recently boomed because of its change of the legal status from a private to public management which forced FONAFIFO to increase its numbers of employees and global wage costs and this without resulting in an improvement of the program effectiveness. This would imply presumably to come back to the previous system where FONAFIFO was managed according to the private labor law, which is unlikely.

[23] They respectively consider a period of time of 30 and 15 years and discount rate between 6% and 16%.

Moreover, according to Pagiola (2008), the lack of targeting and the undifferentiated level of payments, which are early characteristics of the program inherited from the former forest incentives programs, are sub-optimal: they don't allow in fact to generate the maximum of ES (through the targeting) at the best cost (through payments adjusted to the opportunity costs of beneficiaries). However, improvements have been implemented regarding theses issues with the definition since 1999 of targeting criteria and the differentiation of payments since 2009 within the protection modality[24].

Wunscher et al. (2008), using the example of the Nicoya peninsula, estimate that with constant budget, the ES production could be doubled. They estimate that the biggest part of the potential for efficiency improvement (+93% on a global improvement potential of +105%) come from the payments flexibilization to adjust them to the big variations in terms of costs borne by the beneficiaries: opportunity costs, transaction costs and the direct costs of implementing the measures required in the framework of the protection contracts. This leads to a decrease of the average payments' level. According to them, the use of an ES production index to target the lands to be integrated in the program leads to a moderate improvement of the PESP efficiency, as the levels of ES generated by different lands are quite similar. Finally the targeting of the lands using the deforestation probabilities turns out to be not very attractive because of the low variations of the deforestation risk within the region[25] (Wunscher et al., 2008).

[24] In addition to the classical "forest protection" modality for which FONAFIFO pays 64US$/ha/year, it pays for "protection within protected areas" (64 US$/ha/year), "protection of hydrological resources" (80 US$/ha/year) and "protection in conservation blanks" (75 US$/ha/year).

[25] The low variations found in the study area between lands in terms of ES generated on the one hand and of deforestation risks on the other hand may be higher at the national level. Thus, using these two criteria to target PESP participants is probably more promising at the national level to improve the efficiency of the program than what found Wunscher et al. (2008) at the Nicoya peninsula level.

Nevertheless, the practical implementation of this tool allowing the targeting of the lands (according to their deforestation risk and the capacity to generate ES) and the differentiation of the payments is facing several challenges: scientific ones (to access a very precise information regarding the participation costs of potential beneficiaries, the deforestation risk and the capacity to generate ES of the proposed lands), administrative ones (digitalization of applications...) but above all political ones (as it could seem unfair[26]) (Engel et al., 2009). The increase of the transaction costs inferred by the implementation of this new tool seems negligible[27] according to Engel et al. (2009) as they are estimated at 0.27% of the overall budget of the program each year.

3.2. … which may reveal itself counterproductive on the long run

If the differentiation of payments and targeting may be considered as options for improving the PESP efficiency on the short term, it is necessary to take into account the impacts of these options on the social norms and values plus the legitimacy of the program to estimate the improvement potential of efficiency on the long term.

Indeed, it is possible to speculate about the impact on social norms and values of the efficiency gains resulting from a differentiation of payments that leads to a decrease of payments' levels. In fact, a reduction of current payment may jeopardize the efforts of conscientization of the population towards a better valuation of immaterial benefits provided by forests which was one of the long term objectives of the PESP (Gonzalez, interview 2009). Furthermore, according to Kosoy et al. (2007), the level of the payments received does not allow in some PES schemes to

[26] *"In particular, landowners may resist differential payments once homogenous payments have already been introduced, as these may be seen as arbitrary discrimination"* (Engel et al. 2009). Moreover, favorizing landowners that are more prone to deforest may be perceived as inequitable.
[27] They recognize however that FONAFIFO may not share their vision.

compensate integrally the opportunity costs of numerous beneficiaries, who nevertheless participate to the programs as they would have conserved the forest anyway due to social and cultural norms and values. The role of the payment is not to change behaviours, the payments being too low to incite the actors prone to deforest not to do it, but rather to reinforce « *good environmental stewardship* ». (Kosoy et al., 2007). This is often the case of the Costa Rican PESP (Miranda et al., 2003; Ortiz et al., 2003). However, if the payments were reduced in the Costan Rican PESP, they could result counterproductive. As a matter of fact, extrinsic rewards can impact negatively on intrinsic motivation (Deci et al., 1999 quoted by Wunder, 2005), such as the community's own interest or the pride derived from forest conservation. This risk seems particularly high in the case of payments of small amounts (Heyman and Ariely, 2004, quoted by Wunder, 2005) where the efforts in terms of conservation could result lower than in the case in which there would be no payment at all.

The same is true for the reconsideration of the egalitarian principle, by which the levels of payments are the same whatever the ES values or their provision costs are. If it can allow to maximize the efficiency of the PESP on the short term, it can also jeopardize it on the longer term as this principle is the pillar of the PESP legitimacy according to Pascual et al. (2009). They consider it the « fairness criteria » of the program, that is, according to them, the pillar of its legitimacy[28]. Indeed, some interviewees underline how the Costarican actors have resisted the differentiation of payments initiated in 2009, mostly because of pressions from the World Bank.

[28] Pascual and al. (2009) underline that they focus on the distributive effects of the PES on the ES providers, but that this analysis could be deepened to include a broader range of actors, in particular ES buyers and ES potential providers.

Finally, the targeting of the lands according to their deforestation risks (search for additionality) can create perverse incentives: channelling payments only towards the landowners that may degrade the environment can incite the people to degrade the environment if they are not paid for the ES they provide (Wunder, 2005). Some examples at the international level such as the case of the PES RISEMP[29] project (Pagiola et al., 2004) underline this danger.

The targeting of the lands generating more ES, as proposed by Wunscher et al. (2008) and Engel et al. (2009), has already been implemented to some extent by FONAFIFO (but not associated with a flexibilization of payments until 2009) and to date their has been no evidence of counterproductive effects registered in the literature.

Conclusion

The PESP impact on the forest cover of the country is difficult to demonstrate. It is necessary to replace the PESP in the framework of a change in the forest policy of the country, especially the prohibition of forested land uses change, for which it has been considered as compensation, to assess its likely positive impact on forest cover. Furthermore, the PESP appears to be more efficient on the short term than the protected area network, the main alternative tool for conservation, at a lower cost. The ES generation potential by lands under contract seems relatively satisfactory due to the improvement of the targeting of the lands integrated to the program. The PESP appeared also quite competitive regarding the level of transaction costs and functioning costs until 2008, before FONAFIFO functioning costs boomed due to its institutional transformation. The analysis of the payments' levels, that appears already quiet low in Costa Rica, seems however to show a potential for decrease at first sight.

[29] The Regional Integrated Silvopastoral Ecosystem Management Project funded by Global Environment Facility aims to promote improved silvopastoral practices in degraded pastures areas through PES mechanisms. It has been implemented from 2002 to 2007.

A significant potential for improvement of the PESP efficiency exists on the short term, mostly through the differentiation of the payments levels or through the targeting of the areas most prone to be deforested. Nevertheless, these recommendations do not take into account the institutional nature of PESP and the meanings that the stakeholders have given to this program and that ensure its legitimacy. In fact, this evolution would oppose some of its founding principles (non search of additionnality, same level of payments within each modality...), around which the different actors have built its legitimacy. This could jeopardize the program's viability as Wunder (2007) recognizes : « *a PES scheme needs to strike some balance between short-term efficiency and fairness, the latter influencing long-run conservation viability* ». Moreover, these recommendations, by giving priority to a purely utilitarian logic, may weaken on the long run the social norms and values impacting forest conservation and could eventually reveal themselves counterproductive (Martinez-Allier 2002, Vatn 2009). Thus the search for the improvement of the PESP efficiency must take into account its potential effects on the long term and consider on the one hand the nature of this institutional arrangement in order not to undermine its legitimacy and on the other hand its potential impact on social values and norms dealing with conservation.

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Serena
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Le programme SERENA traite des enjeux liés à l'émergence de la notion de « service environnemental » dans le domaine des politiques publiques concernant le milieu rural. Cette notion prend en compte non seulement la fonction productive des écosystèmes à travers l'agriculture, traditionnellement appréhendée par les politiques agricoles, mais aussi d'autres fonctions : régulation, culturelles…

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The overall objective of the SERENA programme is to identify the principles, mechanisms and instruments that enable for an incorporation of the environmental service concept in public action for rural areas. Findings help to adjust public policies and to give practical recommendations for service provision and management.

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